Product Specification

M200RW01 V6

AU OPTRONICS CORPORATION

(   ) **Preliminary Specification**
(V) **Final Specification**

Module	20" Color TFT-LCD
Model Name	M200RW01 V6

Customer	Date	Approved by	Date

Approved by

Prepared by

Milly Sun   2010/11/26

Note: This Specification is subject to change without notice.

Desktop Display Business Group / AU Optronics corporation

Product Specification

AU OPTRONICS CORPORATION

M200RW01 V6

Contents

Product Specification　　　M200RW01 V6

AU OPTRONICS CORPORATION

Record of Revision

Version and Date	Page	Old description	New Description	Remark
0.1　2009/11/23	All	First Edition for Customer	N/A	
0.2　2010/5/18	All	Unify DT Product Specification format	N/A	
0.3　2010/9/5			N/A	
1.0　2010/11/25	15	LED life Time min 25,000 hrs	LED life Time min 30,000 hrs	
1.0　2010/11/26	5	N/A	TCO'03 Compliance	

Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

1.0 Handling Precautions

1) Since front polarizer is easily damaged, pay attention not to scratch it.

2) Be sure to turn off power supply when inserting or disconnecting from input connector.

3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.

6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.

7) Do not open or modify the Module Assembly.

8) Do not press the reflector sheet at the back of the module to any directions.

9) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of the LED lightbar edge. Instead, press at the far ends of the LED light bar edge softly. Otherwise the TFT Module may be damaged.

10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.

11) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.

Product Specification　　M200RW01 V6

AU OPTRONICS CORPORATION

2.0 General Description

This specification applies to the 20 inch-wide Color a-Si TFT-LCD Module M240HW01. The display supports the HD+ 1600(H) x 900(V) screen format and 16.7M colors (RGB 6-bits + Hi-FRC data). The light source of this TFT-LCD module is W-LED. All input signals are 2-channel LVDS interface and this module doesn't contain a driver for backlight.

2.1 Display Characteristics

The following items are characteristics summary on the table under 25℃ condition:

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	508.05 (20.0")
Active Area	[mm]	442.8 (H) x 249.075 (V)
Pixels H x V		1600(x3) x 900
Pixel Pitch	[um]	276.75 (per one triad) ×276.75
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN Mode, Normally White
White Luminance (Center)	[cd/m^2]	250 cd/m^2 (Typ.)
Contrast Ratio		1000 (Typ.)
Optical Response Time	[msec]	5ms (Typ., on/off)
Nominal Input Voltage VDD	[Volt]	+5.0 V
Power Consumption (VDD line + LED line)	[Watt]	15.6 (Typ.)
Weight	[Grams]	1600 (Typ.)
Physical Size	[mm]	462.8 (W) x 272.0 (H) x 10.2 (D)　typ
Electrical Interface		Dual channel LVDS
Support Color		16.7M colors (RGB 6-bit + Hi_FRC)
Surface Treatment		Anti-Glare, 3H
Temperature Range　Operating　Storage (Shipping)	[^{o}C] [^{o}C]	0 to +50 -20 to +60
RoHS Compliance		RoHS Compliance
TCO'03 Compliance		TCO'03 Compliance

Product Specification

AU OPTRONICS CORPORATION

M200RW01　V6

2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25℃:

| Item	Unit	Conditions		Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal　(Right) CR = 10　　(Left)		150	170	- / -	**2**
		Vertical　　(Up) CR = 10　　(Down)		140	160	- / -	
Contrast ratio		Normal Direction		600	1000	-	**3**
Response Time	[msec]	Raising Time (T_{rR})		-	3.5	7.4	**4**
		Falling Time (T_{rF})		-	1.5	2.6	
		Raising + Falling		-	5	10	
Color / Chromaticity Coordinates (CIE)		Red x		0.615	0.645	0.675	**5**
		Red y		0.301	0.331	0.361	
		Green x		0.305	0.335	0.365	
		Green y		0.591	0.621	0.651	
		Blue x		0.122	0.152	0.182	
		Blue y		0.023	0.053	0.083	
Color Coordinates (CIE) White		White x		0.283	0.313	0.343	
		White y		0.299	0.329	0.359	
Central Luminance	[cd/m^2]			200	250	-	**6**
Luminance Uniformity	[%]			75	80	-	**7**
Crosstalk (in 60Hz)	[%]					1.5	**8**
Flicker	dB					-20	**9**

Product Specification
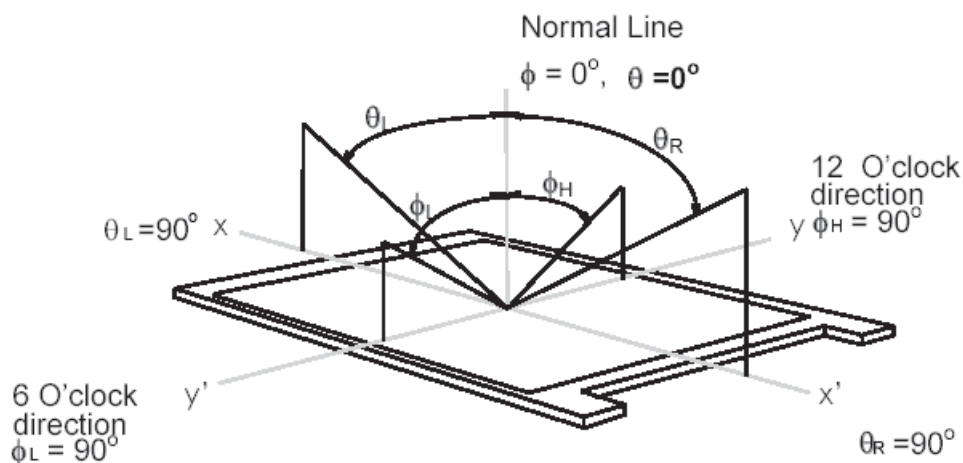
M200RW01 V6

AU OPTRONICS CORPORATION

Note 1: **Measurement method**

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring (at surface 35℃). In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.

Photo detector

Measured distance

LCD Panel

TFT-LCD Module

Center of the screen
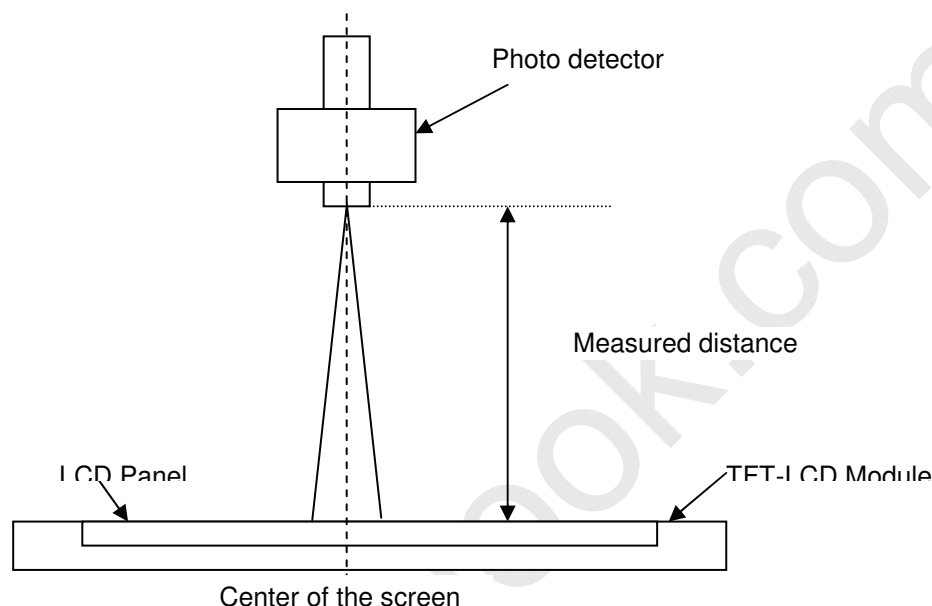
Note 2: **Definition of viewing angle** measured by ELDIM (EZContrast 88)

Viewing angle is the measurement of contrast ratio ≧10, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90° (θ) horizontal left and right and 90° (Φ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.

Normal Line

$\phi = 0^o, \quad \theta = 0^o$

θ_L

θ_R

ϕ_H

ϕ_L

12 O'clock direction

$\theta_L = 90^o$ x

y $\phi_H = 90^o$

6 O'clock direction

$\phi_L = 90^o$　y'

x'

$\theta_R = 90^o$
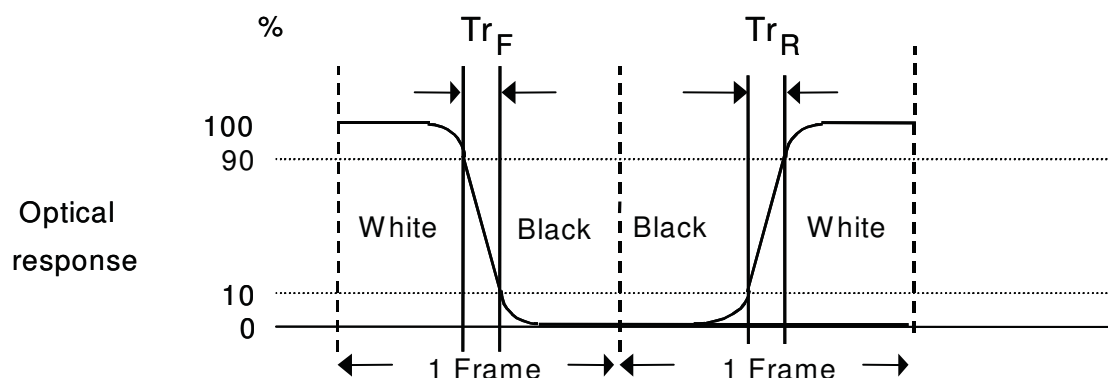
Product Specification

M200RW01 V6

AU OPTRONICS CORPORATION

***Note 3:* Contrast ratio is** measured by TOPCON SR-3

***Note 4:* Definition of Response time** measured by Westar TRD-100A

The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time, Tr_R), and from "Full White" to "Full Black" (falling time, Tf_F), respectively. The response time is interval between the 10% and 90% (1 frame at 60 Hz) of amplitudes.

$Tr_R + Tf_F = 5$ msec (typ.).

Algorithm: │ Gray Level A – Gray Level B │ ≧16, then the average gray to gray response time is 2 ms,

(F= 60 Hz).

***Note 5:* Color chromaticity and coordinates (CIE) is** measured by TOPCON SR-3

***Note 6*: Central luminance is** measured by TOPCON SR-3

***Note 7:* Luminance uniformity of these 9 points is defined as below and** measured by TOPCON SR-3
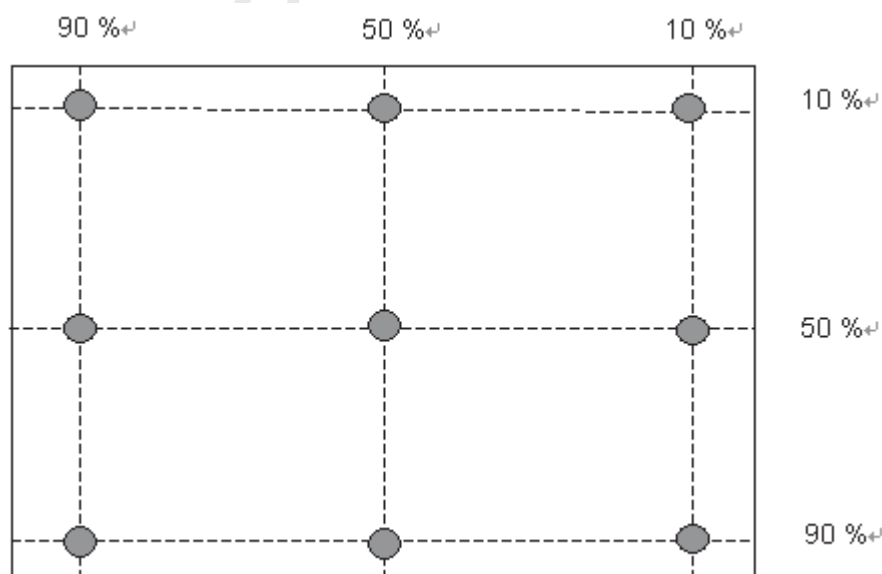
$$Uniformity = \frac{Minimum\ Luminance\ in\ 9\ points\ (1\text{-}9)}{Maximum\ Luminance\ in\ 9\ Points\ (1\text{-}9)}$$

Product Specification

AU OPTRONICS CORPORATION

M200RW01 V6

Note 8: **Crosstalk is defined as below and** measured by TOPCON SR-3

CT = | YB – YA | / YA × 100 (%)

Where

YA = Luminance of measured location without gray level 0 pattern (cd/m2)

YB = Luminance of measured location with gray level 0 pattern (cd/m2)
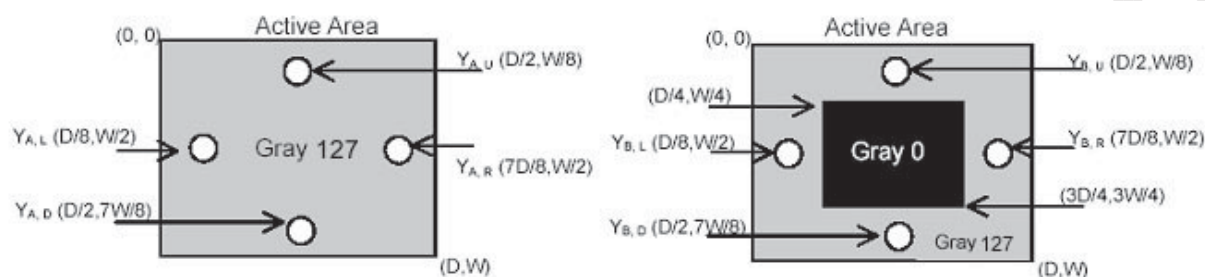
Note 9: **Test Patern: Subchecker Pattern** measured by TOPCON SR-3
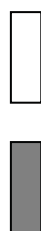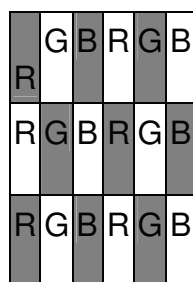
Gray Level = L127

Gray Level = L0

Method: Record dBV & DC value with TRD-100

$$\text{Flicker (dB)} = 20\log\frac{\text{AC Level(at 30 Hz)}}{\text{DC Level}}$$
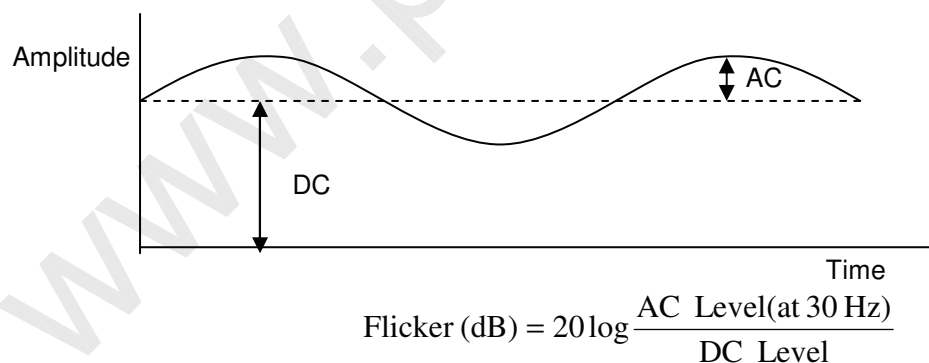
Product Specification M200RW01 V6

AU OPTRONICS CORPORATION

3.0 Functional Block Diagram

The following diagram shows the functional block of the 24.0 inch Color TFT-LCD Module:
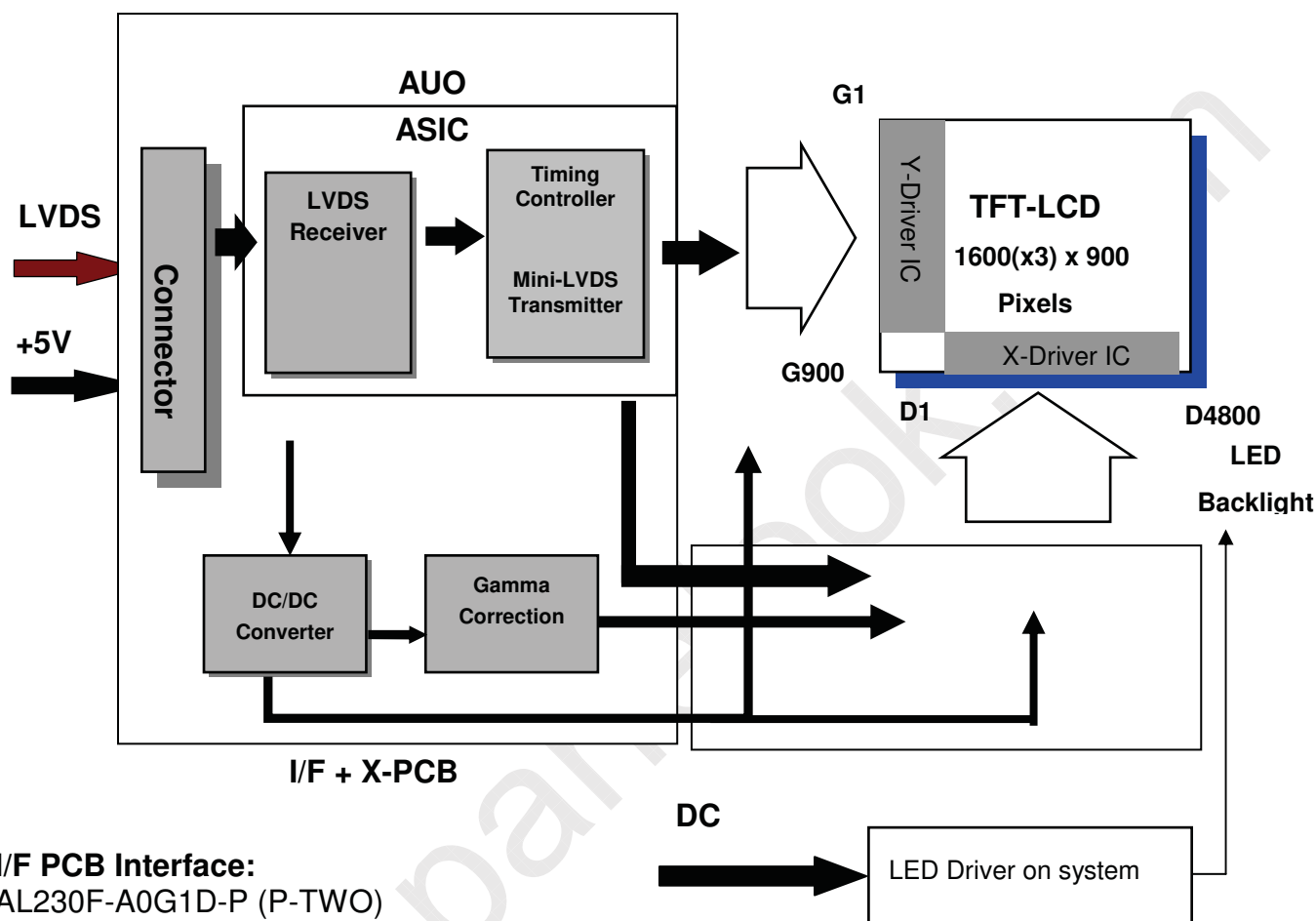
I/F PCB Interface:
AL230F-A0G1D-P (P-TWO)
MSCKT2407P30HB (STM)

Mating Type:

P2407P30 (Unlocked type)
PK2407P30 (Locked type)

Product Specification

M200RW01 V6

AU OPTRONICS CORPORATION

4.0 Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

4.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	0	6.0	[Volt]	*Note 1,2*

4.2 Backlight Unit

Item	Symbol	Min	Max	Unit	Conditions
LED Current	ILED	-	80	[mA]	*Note 1,2*

4.3 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	+50	[^{o}C]	*Note 3*
Operation Humidity	HOP	5	90	[%RH]	
Storage Temperature	TST	-20	+60	[^{o}C]	
Storage Humidity	HST	5	90	[%RH]	

Note 1: With in Ta (25℃)

Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: For quality perfermance, please refer to AUO IIS(Incoming Inspection Standard).
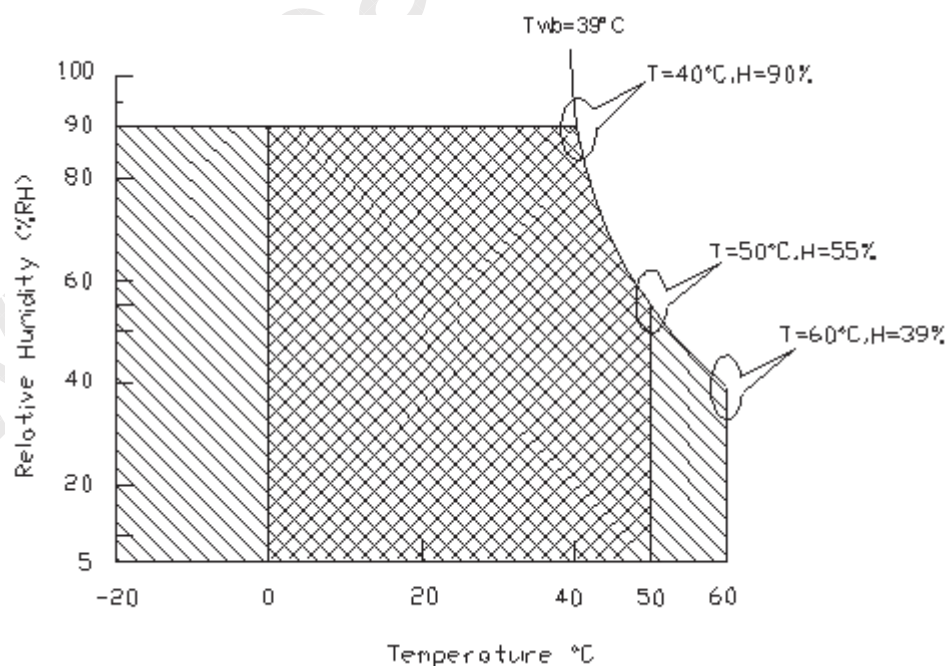
Operating Range　　⬚　　Storage Range　　⬚ + ⬚
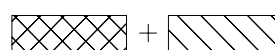
Product Specification

M200RW01　V6

AU OPTRONICS CORPORATION

5.0 Electrical characteristics

5.1 TFT LCD Module

5.1.1 Power Specification

Input power specifications are as following:

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	+/-10%
IDD	Input Current	-	1.0	1.2	[A]	VDD= 5.0V,All black Pattern, At 60Hz
PDD	VDD Power	-	5.0	6.0	[Watt]	VDD= 5.0V,All black Pattern, At 60Hz
IRush	Inrush Current	-	-	3	[A]	*Note 1*
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	500	[mV] p-p	VDD= 5.0V, All Black Pattern At 75Hz

Note 1: Measurement conditions:

The duration of rising time of power input is 470us.
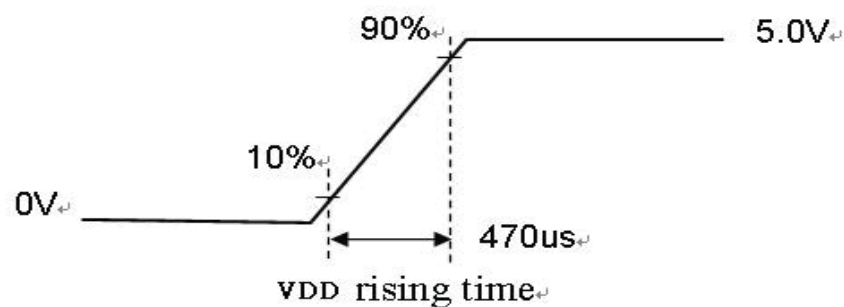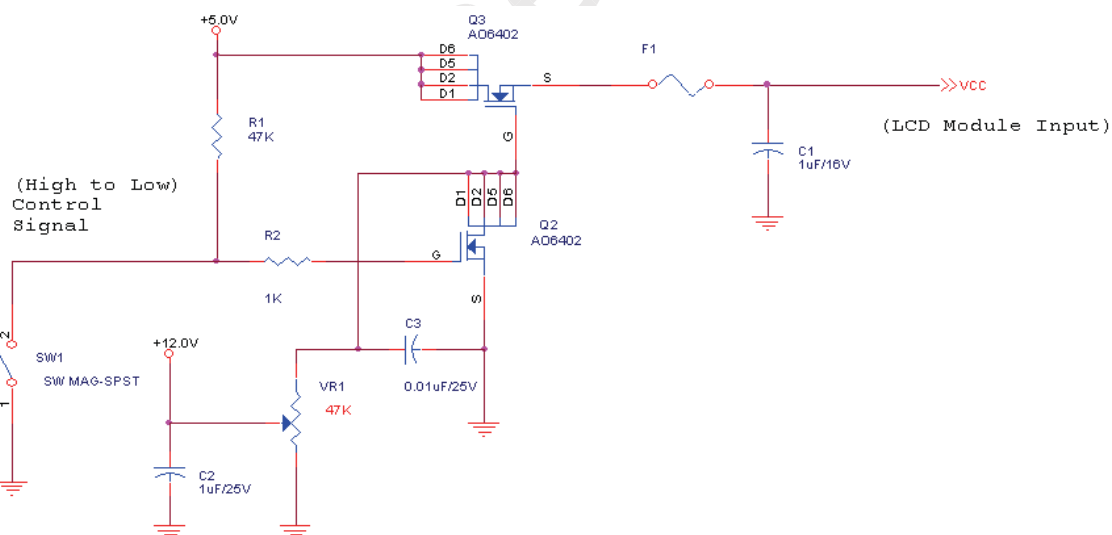
Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off. Please refer to specifications of SN75LVDS82DGG (Texas Instruments) in detail.

1. DC Characteristics of each signal are as following:

Symbol	Parameter	Min	Typ	Max	Units	Condition
VTH	Differential Input High Threshold	-	-	+100	[mV]	VICM = 1.2V **Note 1**
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VICM = 1.2V **Note 1**
VID	Input Differential Voltage	100	-	600	[mV]	**Note 1**
VICM	Differential Input Common Mode Voltage	+1.0	+1.2	+1.5	[V]	VTH-VTL = 200MV (max) **Note 1**

Note 1: LVDS Signal Waveform
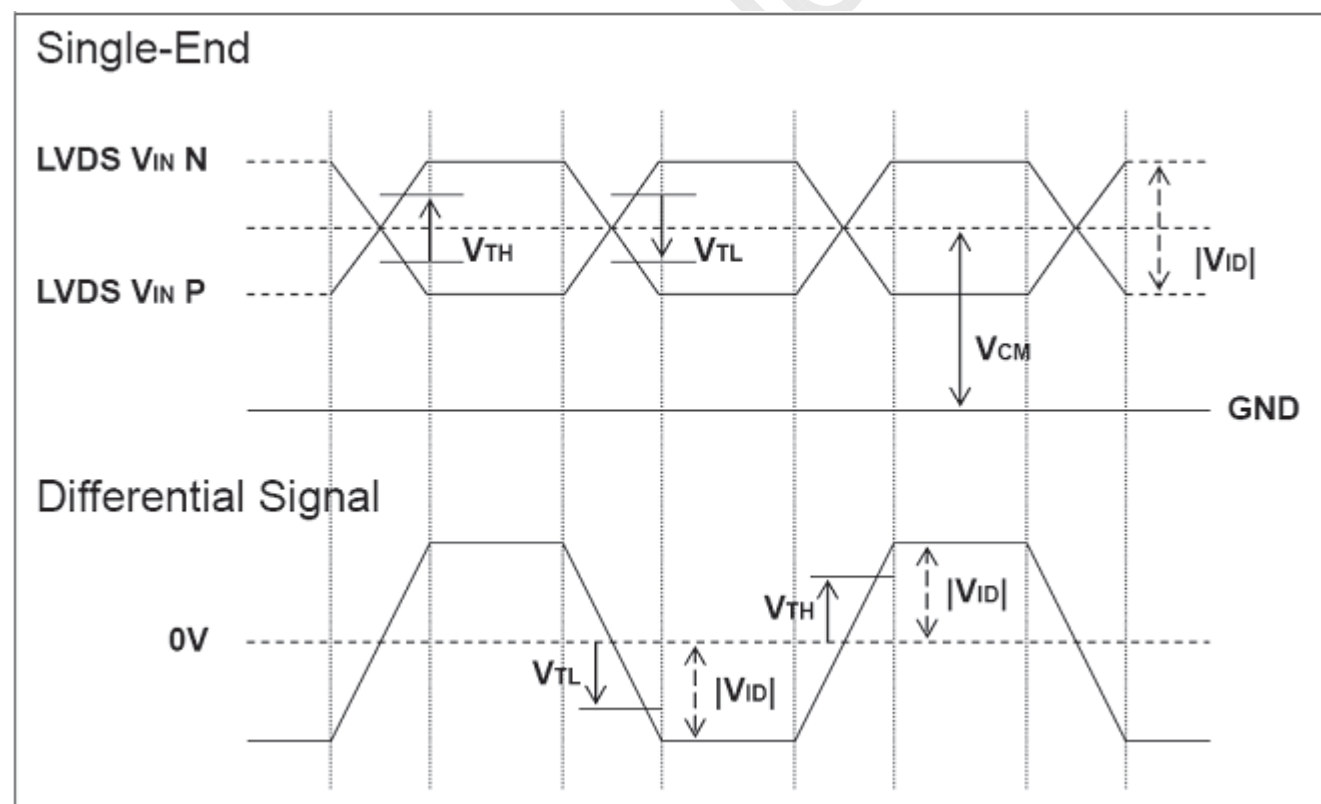
Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

2. AC Characteristics

Description	Symbol	Min	Max	Unit	Note
Maximum deviation of input clock frequency during SSC	F_{DEV}	-	± 3	%	
Maximum modulation frequency of input clock during SSC	F_{MOD}	-	300	KHz	

< Spread Spectrum>
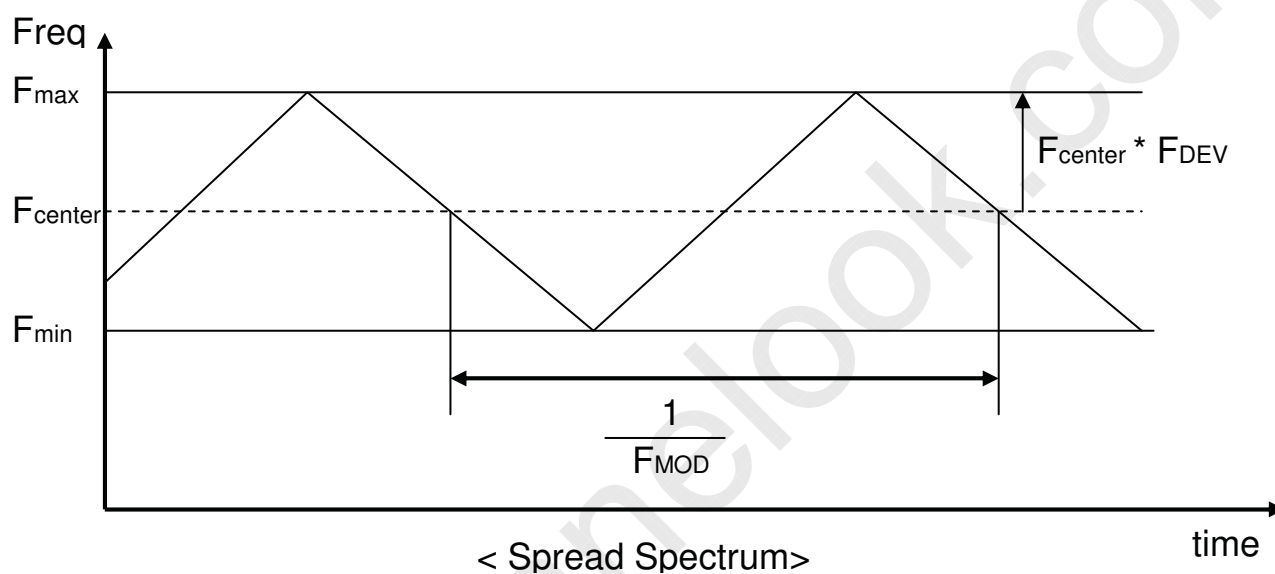
Product Specification

M200RW01 V6

AU OPTRONICS CORPORATION

5.2 Backlight Unit

Parameter guideline for LED driving is under stable conditions at 25℃ (Room Temperature):

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
IR_{LED}	LED Operation Current	-	60	80	[mA] Note 1	**Operating with fixed driving current**
V_{LB}	Light Bar Operation Voltage (for reference)	-	44.2	46.8	[Volt] Note 2	
P_{BLU}	BLU Power consumption (for reference)	-	10.6	15.0	[Watt]	
LT_{LED}	LED life Time (Typical)	30,000	-	-	[Hour] Note 3	

Note 1 :The specified current is input LED chip 100% duty current.

Note 2 : The value showed in the table is one light bar's operation voltage.

Note 3 : Based on the operating current is 60mA.

Note 4: Each LED light bar consists of 52 pcs LED package (4 strings x 13 pcs / string).

Product Specification

M200RW01 V6

AU OPTRONICS CORPORATION

6.0 Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.

6.2 The input data format

Note 1: R/G/B data 7:MSB, R/G/B data 0:LSB   O = "Odd Pixel Data"   E = "Even Pixel Data"

Product Specification

AU OPTRONICS CORPORATION

M200RW01　V6

6.3 Signal Description

The module using one LVDS receiver SN75LVDS82(Texas Instruments). LVDS is a differential signal technology for LCD interface and high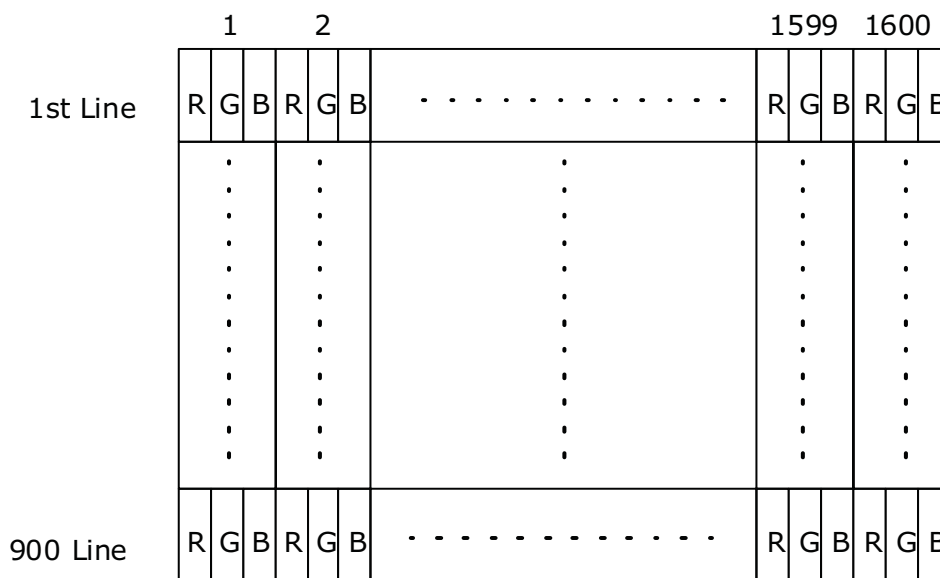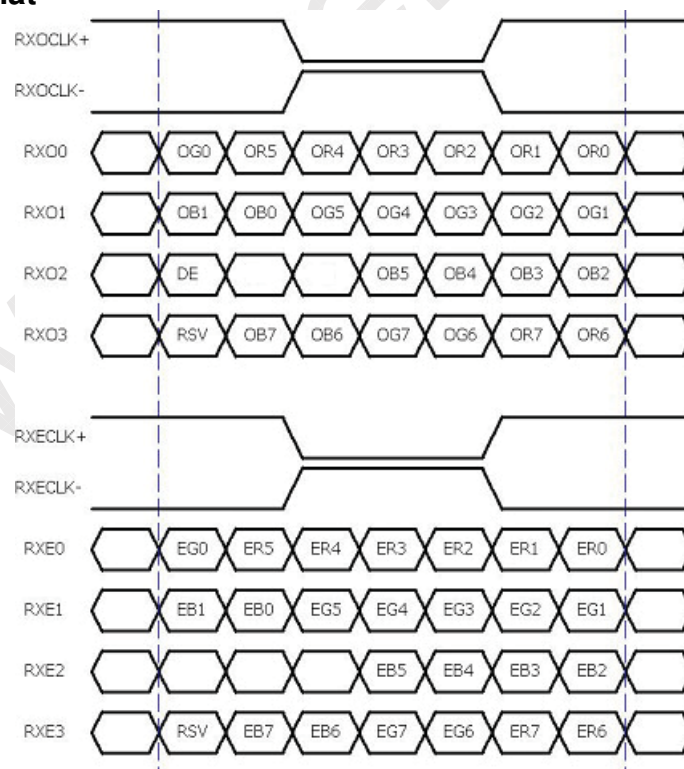 speed data transfer device. LVDS transmitters shall be SN75LVDS83(negative edge sampling). The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

PIN #	SIGNAL NAME	DESCRIPTION
1	RxOIN0-	Negative LVDS differential data input (Odd data)
2	RxOIN0+	Positive LVDS differential data input (Odd data)
3	RxOIN1-	Negative LVDS differential data input (Odd data)
4	RxOIN1+	Positive LVDS differential data input (Odd data)
5	RxOIN2-	Negative LVDS differential data input (Odd data, DSPTMG)
6	RxOIN2+	Positive LVDS differential data input (Odd data, DSPTMG)
7	GND	Power Ground
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)
10	RxOIN3-	Negative LVDS differential data input (Odd data)
11	RxOIN3+	Positive LVDS differential data input (Odd data)
12	RxEIN0-	Negative LVDS differential data input (Even data)
13	RxEIN0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
15	RxEIN1-	Positive LVDS differential data input (Even data)
16	RxEIN1+	Negative LVDS differential data input (Even data)
17	GND	Power Ground
18	RxEIN2-	Negative LVDS differential data input (Even data)
19	RxEIN2+	Positive LVDS differential data input (Even data)
20	RxECLK-	Negative LVDS differential clock input (Even clock)
21	RxECLK+	Positive LVDS differential clock input (Even clock)
22	RxEIN3-	Negative LVDS differential data input (Even data)
23	RxEIN3+	Positive LVDS differential data input (Even data)
24	GND	Power Ground
25	NC	No connection (for AUO test only. Do not connect)
26	NC	No connection (for AUO test only. Do not connect)
27	NC	No connection (for AUO test only. Do not connect)
28	VDD	Power +5V
29	VDD	Power +5V
30	VDD	Power +5V

Note1: Start from left side

Product Specification

AU OPTRONICS CORPORATION

M200RW01 V6

Input Connector First Pin

81.80

100.43

Module Shipping Label

BLU Barcode Label

1   30

RxOIN0-   VDD
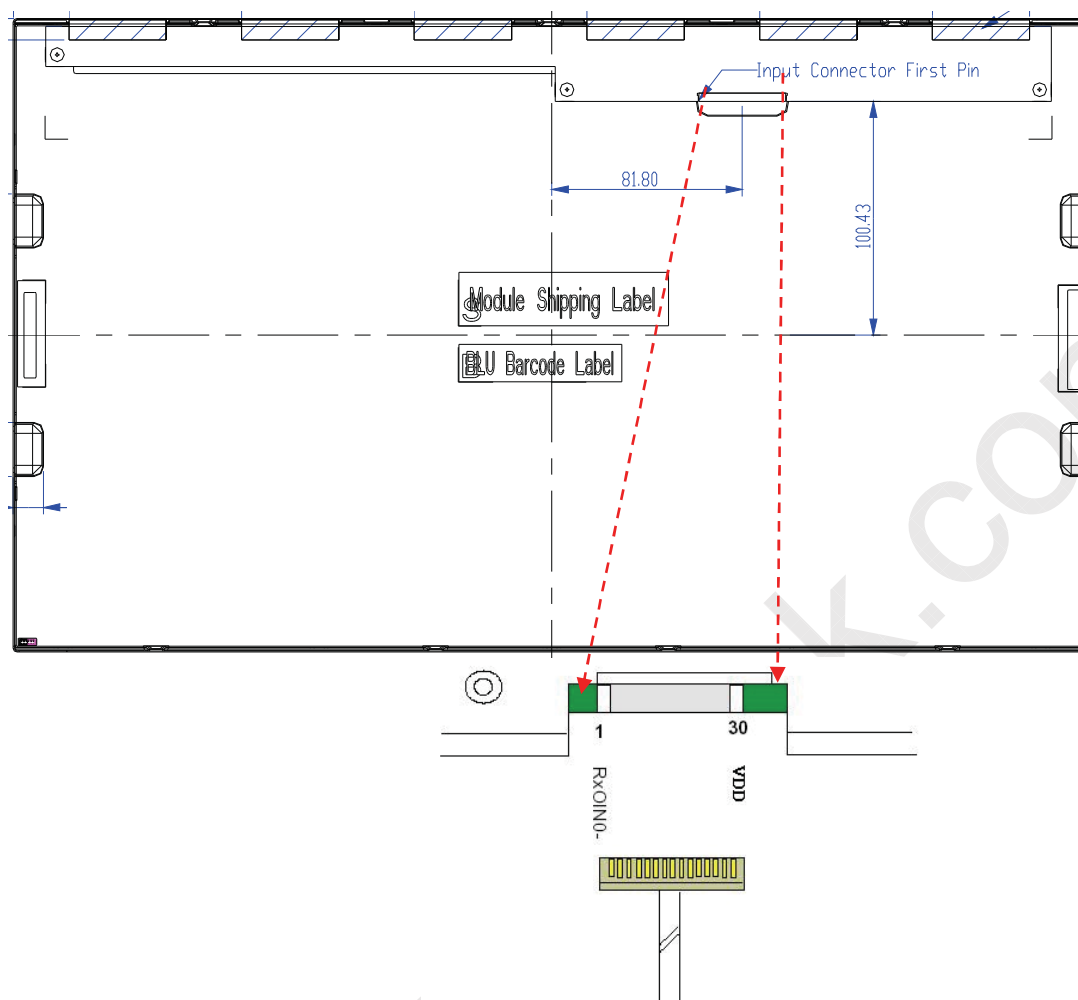
Note2: Input signals of odd and even clock shall be the same timing.

Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

6.4 Timing Characteristics

Basically, interface timing described here is not actual input timing of LCD module but close to output timing of SN75LVDS82DGG (Texas Instruments) or equivalent.

Item		Symbol	Min	Typ	Max	Unit
Data CLK		1/Tclk	43.2	60.5	80	[MHz]
H-section	Period	Th	950	1080	2047	[Tclk]
	Display Area	Tdisp(h)	800	800	800	[Tclk]
	Blanking	Tblk(h)	150	280	-	[Tclk]
V-section	Period	Tv	910	934	2047	[Th]
	Display Area	Tdisp(v)	900	900	900	[Th]
	Blanking	Tblk(v)	10	34	-	[Th]
Frame Rate		F	50	60	75	[Hz]

Note : DE mode only

Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

6.5 Timing diagram
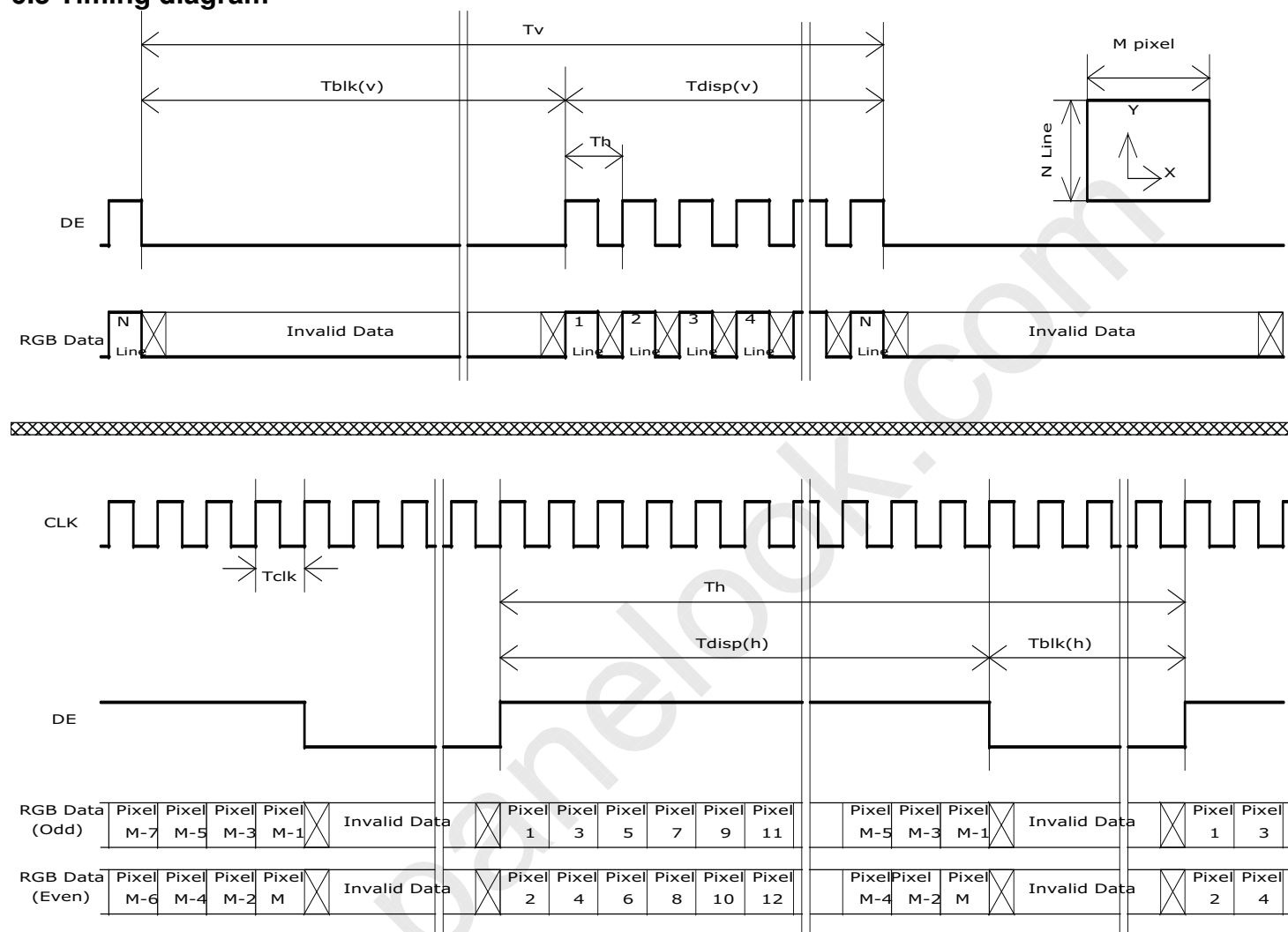
Product Specification

AU OPTRONICS CORPORATION

M200RW01 V6

6.6 Power ON/OFF Sequence

VDD power and lamp on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.
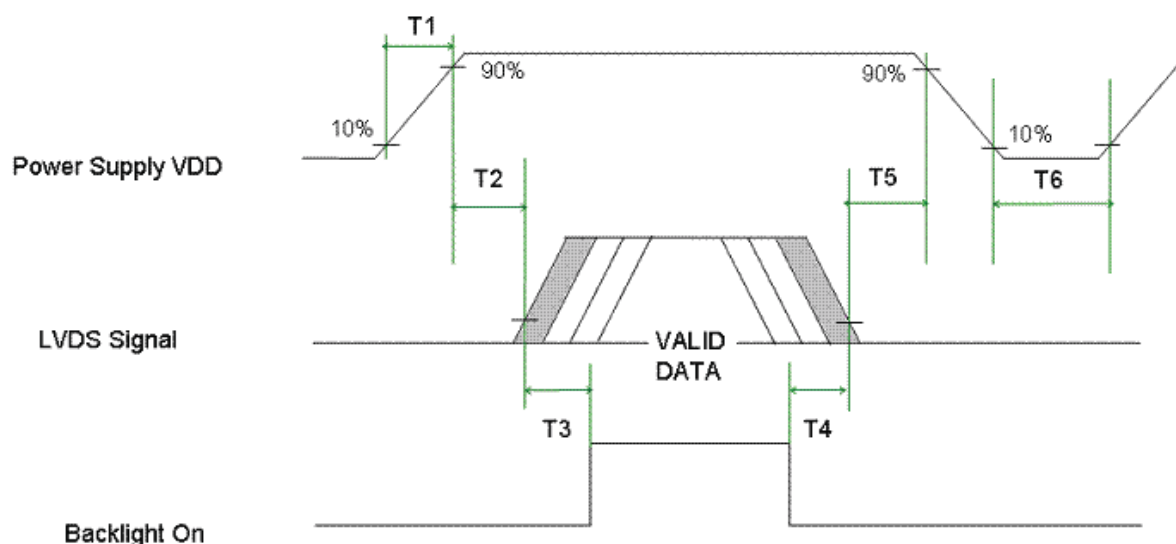
Parameter	Value		Unit
	Min.	Max.	
T1	0.5	10	[msec]
T2	0	50	[msec]
T3	500	-	[msec]
T4	200	-	[msec]
T5	0	50	[msec]
T6	1000	-	[msec]

Product Specification

AU OPTRONICS CORPORATION

M200RW01 V6

7.0 Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.1 TFT LCD Module

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	P-TWO SMT
Type Part Number	AL230F-A0G1D-P (P-TWO) MSCKT2407P30HB (STM)
Mating Housing Part Number	P2407P30 (Unlocked type) PK2407P30 (Locked type)

7.1.1 Pin Assignment

Pin#	Signal Name	Pin#	Signal Name
1	RxOIN0-	2	RxOIN0+
3	RxOIN1-	4	RxOIN1+
5	RxOIN2-	6	RxOIN2+
7	GND	8	RxOCLKIN-
9	RxOCLKIN+	10	RxOIN3-
11	RxOIN3+	12	RxEIN0-
13	RxEIN0+	14	GND
15	RxEIN1-	16	RxEIN1+
17	GND	18	RxEIN2-
19	RxEIN2+	20	RxECLKIN-
21	RxECLKIN+	22	RxEIN3-
23	RxEIN3+	24	GND
25	NC (for AUO test only. Do not connect)	26	NC (for AUO test only. Do not connect)
27	NC (for AUO test only. Do not connect)	28	VDD
29	VDD	30	VDD

Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

7.2 Connector on Backlight Unit.

This connector is mounted on LED light-bar.

Connector Name / Designation	Light Bar Connector
Manufacturer	Cvilux
Type Part Number	CI1406M1HRB-NH

7.2.1 Pin assignment

Pin no.	Signal name
1	IRLED (current out)
2	IRLED (current out)
3	VLED (voltage in)
4	VLED (voltage in)
5	IRLED (current out)
6	IRLED (current out)

8.0 Reliability Test

Environment test conditions are listed as following table.

Product Specification

M200RW01 V6

AU OPTRONICS CORPORATION

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50℃, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0℃, 300hours	
High Temperature Storage (HTS)	Ta= 60℃, 300hours	
Low Temperature Storage (LTS)	Ta= -20℃, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Duration: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Drop Test	Height: 46 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	*1*
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 15 points, 25 times/ point.	*2*
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 15 points, 25 times/ point.	
Altitude Test	Operation:10,000 ft Non-Operation:30,000 ft	

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20℃ to 60℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: EN61000-4-2, ESD class B: Certain performance degradation allowed
No data lost
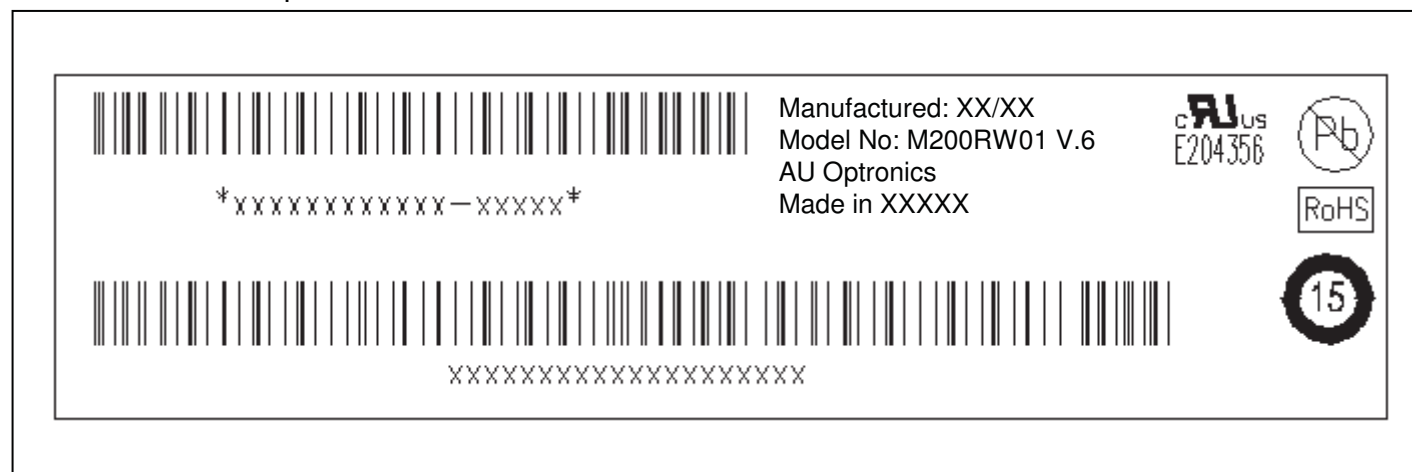Self-recoverable
No hardware failures.

Product Specification   M200RW01 V6

AU OPTRONICS CORPORATION

9.0 Shipping Label

The label is on the panel as shown below:

```
┌─────────────────────────────────────────────────────────────┐
│                                                               │
│   ║║║║║║║║║║║║║║║║║║║║║║║║║     Manufactured: XX/XX    c RU us │
│                                 Model No: M200RW01 V.6  E204356│
│   *xxxxxxxxxxxxx－xxxxx*         AU Optronics          ┌──────┐│
│                                 Made in XXXXX         │ RoHS ││
│                                                       └──────┘│
│   ║║║║║║║║║║║║║║║║║║║║║║║║║║║║║║║                        ┌──┐   │
│                                                        │15│   │
│                                                        └──┘   │
│         xxxxxxxxxxxxxxxxxxxx                                   │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

Note 1: For Pb Free products, AUO will add ⓟ for identification.

Note 2: For RoHS compatible products, AUO will add [RoHS] for identification.

Note 3: For China RoHS compatible products, AUO will add ⑮ for identification.

Note 4: The Green Mark will be presented only when the green documents have been ready by

AUO Internal Green Team.

10.0 Mechanical Characteristics

NOTES :
1. THE DIMENSION EXCLUDES DEFORMATION.
2. TOLERANCE WITHOUT NOTICED TO BE 0.5mm.
3. SUGGEST FOR CUSTOMER SCREW SELECTION:
   CUSTOMER ASSEMBLY TOLERANCE + CUSTOMER CHASSIS THICKNESS.
4. TORQUE OF M3 USER HOLE SHOULD BE WITHIN 4 kgF-cm
   AND JUST RESCREW 10 TIMES.
5. USER HOLE SCREW PENETRATION 4.0mm MAX.

Ver 0.2